

BEST AVAILABLE COPY

REMARKS

The Examiner objected to claims 20 and 28. In response, Applicants have canceled claims 20 and 28.

The Examiner rejected claims 8-17 and 20-28 under 35 U.S.C. §112, first paragraph, as failing to comply with the enablement requirement.

The Examiner rejected claims 8, 10-13, 14, 21, 22 and 27 under 35 U.S.C. §103(a) as allegedly being unpatentable over Brigham et al. (U.S. Patent No. 6,380,010) in view of Houston (U.S. Patent No. 6,045,625).

The Examiner rejected claims 9, 15, 20 and 23-26 under 35 U.S.C. §103(a) as allegedly being unpatentable over Brigham et al. (U.S. Patent No. 6,380,010) in view of Houston (U.S. Patent No. 6,045,625) and Zahurak et al. (U.S. Patent No. 6,593,192).

The Examiner rejected claim 13 under 35 U.S.C. §103(a) as allegedly being unpatentable over Brigham et al. (U.S. Patent No. 6,380,010) in view of Houston (U.S. Patent No. 6,045,625) and Choi (U.S. Patent No. 6,383,849).

Applicants respectfully traverse the §112 and §103 rejections with the following arguments.

35 U.S.C. §112

Claims 8-17 and 20-28 are rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the enablement requirement.

The Examiner alleges that "The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The Applicant states in the claim "a body comprising a portion of the semiconductor layer" (See Claim 8 and 15). However, in the specification Applicant does not appear to state the limitation disclosed above instead it states "semiconductor layer 208 (i.e. the transistor body)" (See Paragraph 41). Additionally, the Applicant states that "the source structure is at least as thick as a combination of the semiconductor layer and the first buried layer, and wherein the drain structure is at least as thick as the combination of the semiconductor layer and the first buried insulator layer" (See Claims 27 and 28). However, in the specification Applicant does not appear to state the limitation disclosed above. Claims 9-14, 17 and 20-26 depend directly or indirectly from a rejected claim and are, therefore, also rejected under 35 U.S.C. 112, first paragraph for the reasons set above".

As to claims 8 and 15, Applicants have amended the specification on page 12, lines 12-14 to include the limitation "a body comprising a **portion** of the semiconductor layer" (emphasis added) as claimed by Applicant's claims 8 and 15. Applicants contend that no new matter has been added because it is described in Applicant's detailed description and shown in FIGS. 3-7 that recesses are formed in an original semiconductor layer 208 and that a body is formed from the semiconductor layer 208 situated between the recesses and therefore Applicant's contend that the body is formed from a portion of the original the semiconductor layer 208 as claimed by

Applicants claims 8 and 15. Therefore, Applicants contend that claims 8 and 15 are in condition for allowance under 35 U.S.C. 112, first paragraph. Since claims 9-14, 21-23, and 27 depend from claim 8 and claims 16, 17, and 24-26 depend from claim 15, Applicants contend that claims 9-14, 16, 17, 21-23, and 24-27 are likewise in condition for allowance.

As to claim 27, Applicants have amended the specification on page 14, lines 9-11 to include the limitation "the source structure is at least as thick as a combination of the semiconductor layer and the first buried layer, and wherein the drain structure is at least as thick as the combination of the semiconductor layer and the first buried insulator layer" as claimed by Applicant's claim 27. Applicants contend that no new matter has been added because it is described in Applicant's detailed description that recesses are formed through a semiconductor layer 208 and an oxide layer 206 and that source and drain structures (S/D structures 208) are formed in the recesses and therefore Applicants contend that the source and drain structures must be at least as thick as semiconductor layer and the oxide layer 206 (i.e., the first buried insulator layer) because the source and drain structures are formed in the aforementioned layers. Therefore, Applicants contend that claim 27 is in condition for allowance under 35 U.S.C. 112, first paragraph.

35 U.S.C. §103**Claim 8**

The Examiner rejected claims 8, 10-13, 14, 21, 22 and 27 under 35 U.S.C. §103(a) as allegedly being unpatentable over Brigham et al. (U.S. Patent No. 6,380,010) in view of Houston (U.S. Patent No. 6,045,625).

The Examiner alleges that "In regards to claims 8 and 10-13; Brigham et al. ('Brigham') discloses the following: a) a semiconductor wafer (102) (For Example: See Figure 1); b) a first recess and a second recess (For Example: See Figure 2);

c) a body (104) situated between the first recess and the second recess, the body comprising a top body surface and a bottom body surface that defines a body thickness (For Example: See Figure 11);

d) a source structure (114) within into the first recess, the source structure comprising a source region (For Example: See Figure 11);

e) a drain region (114) within into the second recess, the drain structure comprising a drain region (For Example: See Figure 11); and

f) a top portion of the source structure and a top portion of the drain structure are within and about the body thickness (For Example: See Figure 11).

In regards to claims 8 and 10-13, Brigham fails to disclose the following:

a) a semiconductor layer, that comprises single crystal silicon, overlying a buried insulator having three layers that comprise silicon dioxide, wherein the second layer comprises silicon nitride, wherein the third layer comprises silicon dioxide.

However, Houston discloses a semiconductor layer (16), that comprises single crystal silicon, overlying a buried insulator (14) having three layers that comprise silicon dioxide, and silicon nitride (For Example: See Figure 1, Figure 8c and Column 2 Lines 43-60). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Brigham to include a semiconductor layer, that comprises single crystal silicon, overlying a buried insulator having three layers that comprise silicon dioxide and silicon nitride as disclosed in Houston because it aids in eliminating warping (For Example: See Column 1 Lines 49-62 and Column 2 Lines 43-60) ”.

Applicants respectfully contend that claim 8 is not is not unpatentable over Brigham in view of Houston for at least the following reasons.

As a first reason why claim 8 is not unpatentable over Brigham in view of Houston is that Brigham and Houston do not individually or collectively teach or suggest the following feature of claim 8: “a first recess and a second recess **through** the semiconductor layer and a first layer of the buried insulator ” (emphasis added). Brigham and Houston do not individually or collectively teach or suggest recesses **through** a semiconductor layer as claimed by Applicant's claim 8. The term “through ” is defined as “ into at one side or point and out at another and especially the opposite side of ” by the Merriam-Webster Dictionary at website <http://www.merriam-webster.com/cgi-bin/dictionary>. In contrast, Brigham teaches in col. 4, lines 35-43 and FIG. 11, recesses 110 **within** an insulating layer 108 and not recesses **through** (i.e., into at one side or point and out at another) a semiconductor layer as claimed by Applicant's claim 8. Accordingly, Applicants maintain that claim 8 is not unpatentable over Brigham in view of Houston.

09/682,957

13

As a second reason why claim 8 is not unpatentable over Brigham in view of Houston is that Brigham and Houston do not individually or collectively teach or suggest the following feature of claim 8: "wherein a top portion of the source structure and a top portion of the drain structure are within and **abut** the body thickness " (emphasis added). Brigham and Houston do not individually or collectively teach or suggest that a body formed from the semiconductor layer **abuts** (i.e., borders or touches) a source and drain structure as claimed by Applicant's claim 8. In contrast, Brigham teaches in Col. 6, lines 53-54 and FIG. 11, " S/D regions 114 are **isolated** from the transistor channel and silicon pillar 104 by a barrier layer 112. " (emphasis added). The source and drain structures 114 in Brigham do not **abut** the body 104 formed from the semiconductor layer as in Applicant's claim 8. In contrast, the source and drain structures 114 in Brigham are **isolated** from the body 104. Accordingly, Applicants maintain that claim 8 is not unpatentable over Brigham in view of Houston.

As a third reason why claim 8 is not unpatentable over Brigham in view of Houston relates to the Examiner's argument for modifying Brigham with Houston. The Examiner admits that " Brigham fails to disclose...a semiconductor layer...overlying a buried insulator ". The Examiner argues: " Houston discloses a semiconductor layer (16), that comprises single crystal silicon, overlying a buried insulator (14) having three layers that comprise silicon dioxide, and silicon nitride (For Example: See Figure 1, Figure 8c and Column 2 Lines 43-60). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Brigham to include a semiconductor layer, that comprises single crystal silicon, overlying a buried insulator having three layers that comprise silicon dioxide and silicon nitride as disclosed in Houston because it aids in eliminating warping (For Example: See

Column 1 Lines 49-62 and Column 2 Lines 43-60 ".

In response, Applicants contend that Houston teaches a structure comprising a multilayer structure on a silicon substrate 12. The multilayer structure of Houston comprises an intermediate layer 14b between two insulating layers 14a and 14c. In order to eliminate warping, the thermal coefficient of expansion of the intermediate layer 14b substantially matches the thermal coefficient of expansion of the silicon substrate 12 more nearly than does the two insulating layers 14a and 14c, thereby preventing warping of the structure (see Houston, col. 2, lines 47-55). An elimination of warping is not applicable to the structure of Brigham because Brigham does not have a buried insulator comprising multiple layers and therefore Brigham does not have a warping problem. Applicants question why one of ordinary skill in the art would apply the multilayer structure of Houston to the structure of Brigham to eliminate a warping problem that does not exist in Brigham. Therefore, Applicant's contend that the Examiner's reason for modifying Brigham with Houston is not persuasive. Accordingly, Applicants maintain that claim 8 is not unpatentable over Brigham in view of Houston.

Based on the preceding arguments, Applicants respectfully maintain that claim 8 is not is not unpatentable over Brigham in view of Houston, and that claim is in condition for allowance. Since claims 9-14, 21-23 and 27 depend from claim 8, Applicants contend that claims 9-14, 21-23 and 27 are likewise in condition for allowance.

Claim 15

The Examiner rejected claims 9, 15, 20 and 23-26 under 35 U.S.C. §103(a) as allegedly being unpatentable over Brigham et al. (U.S. Patent No. 6,380,010) in view of Houston (U.S.

09/682,957

15

Patent No. 6,045,625) and Zahurak et al. (U.S. Patent No. 6,593,192).

The Examiner alleges that "In regards to claim 15, Brigham discloses the following:

- a) a semiconductor wafer (For Example: See Figure 11);
- b) a first recess and a second recess (For Example: See Figure 11);
- c) the first recess comprising a source structure for transistor (For Example: See Figure 11);
- d) the first recess comprising a drain structure for transistor (For Example: See Figure 11); and
- e) a body situated between the first recess and the second recess, the body comprising a top body surface and a bottom body surface that defines a body thickness (For Example: See Figure 11);

In regards to claim 15, Brigham fails to disclose the following:

- a) a semiconductor layer buried on a buried insulator which comprises a first buried insulator on a second buried insulator different from the first buried insulator layer wherein the first buried insulator comprises silicon dioxide and the second buried insulator comprises a silicon nitride.

However, Houston discloses a semiconductor with a semiconductor layer, that comprises single crystal silicon, overlying a buried insulator having at least two layers that comprise silicon dioxide and silicon nitride (For Example: See Figure 1, Figure 8c and Column 2 Lines 43-60). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Brigham to include a semiconductor layer, that comprises single crystal silicon, overlying a buried insulator having at least two layers that comprise silicon dioxide and silicon nitride as disclosed in Houston because it aids in eliminating

warping (For Example: See Column 1 Lines 49-62 and Column 2 Lines 43-60).

Additionally, since Brigham and Houston are both from the same field of endeavor, the purpose disclosed by Houston would have been recognized in the pertinent art of Brigham.

b) the first layer of the buried insulator is at least as thick as the semiconductor layer.

However, Zahurak discloses a buried insulator that is at least as thick as the semiconductor layer (For Example: See Figure 2). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Brigham to include a buried insulator that is at least as thick as the semiconductor layer as disclosed in Zahurak because it aids in increasing performance (For Example: See Column 1 Lines 5-67 and Column 2 Lines 1-24) ”.

Applicants respectfully contend that claim 15 is not is not unpatentable over Brigham in view of Houston and Zahurak for at least the following reasons.

As a first reason why claim 15 is not unpatentable over Brigham in view of Houston and Zahurak is that Brigham, Houston, and Zahurak do not individually or collectively teach or suggest the following feature of claim 15: “a first recess and a second recess **through** the semiconductor layer and said first layer of the buried insulator ” (emphasis added). Brigham, Houston and Zahurak do not individually or collectively teach or suggest recesses **through** a semiconductor layer as claimed by Applicant’s claim 15. The term “through ” is defined as “ into at one side or point and out at another and especially the opposite side of ” by the Merriam-Webster Dictionary at website [http:// www.merriam-webster.com/cgi-bin/dictionary](http://www.merriam-webster.com/cgi-bin/dictionary). In contrast, Brigham teaches in col. 4, lines 35-43 and FIG. 11, recesses 110 **within** an insulating

layer 108 and not recesses **through** (i.e., into at one side or point and out at another) a semiconductor layer as claimed by Applicant's claim 15. Accordingly, Applicants maintain that claim 15 is not unpatentable over Brigham in view of Houston and Zahurak.

As a second reason why claim 15 is not unpatentable over Brigham in view of Houston and Zahurak relates to the Examiner's argument for modifying Brigham with Houston. The Examiner admits that "Brigham fails to disclose...a semiconductor layer...on a buried insulator". The Examiner argues: "Houston discloses a semiconductor layer (16), that comprises single crystal silicon, overlying a buried insulator (14) having three layers that comprise silicon dioxide, and silicon nitride (For Example: See Figure 1, Figure 8c and Column 2 Lines 43-60). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Brigham to include a semiconductor layer, that comprises single crystal silicon, overlying a buried insulator having three layers that comprise silicon dioxide and silicon nitride as disclosed in Houston because it aids in eliminating warping (For Example: See Column 1 Lines 49-62 and Column 2 Lines 43-60".

In response, Applicants contend that Houston teaches a structure comprising a multilayer structure on a silicon substrate 12. The multilayer structure of Houston comprises an intermediate layer 14b between two insulating layers 14a and 14c. In order to eliminate warping, the thermal coefficient of expansion of the intermediate layer 14b substantially matches the thermal coefficient of expansion of the silicon substrate 12 more nearly than does the two insulating layers 14a and 14c, thereby preventing warping of the structure (see Houston, col. 2, lines 47-55). An elimination of warping is not applicable to the structure of Brigham because Brigham does not have a buried insulator comprising multiple layers and therefore Brigham does

not have a warping problem. Applicants question why one of ordinary skill in the art would apply the multilayer structure of Houston to the structure of Brigham to eliminate a warping problem that does not exist in Brigham. Therefore, Applicant's contend that the Examiner's reason for modifying Brigham with Houston is not persuasive. Accordingly, Applicants maintain that claim 15 is not unpatentable over Brigham in view of Houston and Zahurak.

Based on the preceding arguments, Applicants respectfully maintain that claim 15 is not is not unpatentable over Brigham in view of Houston and Zahurak, and that claim 15 is in condition for allowance. Since claims 16,17, and 24-26 depend from claim 15, Applicants contend that claims 16,17, and 24-26 are likewise in condition for allowance.

CONCLUSION

Based on the preceding arguments, Applicants respectfully believe that all pending claims and the entire application meet the acceptance criteria for allowance and therefore request favorable action. If the Examiner believes that anything further would be helpful to place the application in better condition for allowance, Applicants invites the Examiner to contact Applicants' representative at the telephone number listed below.

Date: 09/28/2004Jack P. Friedman

Jack P. Friedman

Registration No. 44,688

Schmeiser, Olsen & Watts

3 Lear Jet Lane, Suite 201

Latham, New York 12110

(518) 220-1850

**This Page is Inserted by IFW Indexing and Scanning
Operations and is not part of the Official Record**

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☐ **BLACK BORDERS**
- ☐ **IMAGE CUT OFF AT TOP, BOTTOM OR SIDES**
- ☐ **FADED TEXT OR DRAWING**
- ☐ **BLURRED OR ILLEGIBLE TEXT OR DRAWING**
- ☐ **SKEWED/SLANTED IMAGES**
- ☐ **COLOR OR BLACK AND WHITE PHOTOGRAPHS**
- ☐ **GRAY SCALE DOCUMENTS**
- ☐ **LINES OR MARKS ON ORIGINAL DOCUMENT**
- ☐ **REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY**
- ☐ **OTHER:** _____

IMAGES ARE BEST AVAILABLE COPY.

As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.